

REMARKS

Claims 1-4 and 6-28 are presently pending in the application.

Claim 1 has been amended to incorporate some of the subject matter from claim 5, now canceled. Claim 6 has been rewritten in independent form to incorporate subject matter from original claim 1. New dependent claims 7-9 and 11-13 are the same as claims 2-4 but depend from claims 6 and 10 respectively. New independent claim 10 is similar to original claim 1, but recites that the composition consists essentially of components (A), (B), and (C), in which (C) is a sulfur-based additive other than zinc dialkyldithiophosphates, which is supported in claim 5 and in the specification at least at page 16, last 6 lines to page 17, line 6 and in the Examples. The combination of (A), (B), and (C) provides a different and special function and the other additives which may be included are known additives with common enhancing functions. New claims 14 and 15 recite the same subject matter as canceled claim 5. Claims 16-19 are supported in the specification at least at page 31, lines 6-18 and new claims 20-25 are supported at least at page 19, line 12 to page 20, line 3. Finally, new claims 26-28 are supported at least at page 16, lines 7-8 and in Example 9 in Table 1-2 at page 43. No new matter has been added by these amendments, and entry is respectfully requested.

In the Office Action, the Examiner has rejected claims 1-5 under 35 U.S.C. § 102(a) or § 102(b) as being anticipated by or under § 103(a) as being unpatentable over EP 1 104 800 ("EP '800"). Additionally, the Examiner has rejected claims 1-5 under 35 U.S.C. § 102(a) or § 102(b) as being anticipated by or under § 103(a) as being unpatentable over each of JP 2000-034491 ("JP '491") and JP 2002-003875 ("JP '875"). Finally, the Examiner has rejected claims 1-6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,303,546 of Hata et al. ("Hata"). Applicant respectfully traverses these rejections and the arguments in support thereof as follows, and respectfully requests reconsideration and withdrawal of the rejections.

Rejections Under 35 U.S.C. § 102(a), § 102(b), and § 103(a) Based on EP '800

Regarding claims 1-5, the Examiner argues that EP '800 teaches a lubricating oil composition for internal combustion engines which comprises a major amount of base oil of lubricating viscosity and, as additives, a metal-containing detergent, a boron-containing alkenyl- or alkyl succinimide, a zinc dialkyldithiophosphate, an oxidation inhibitor and an ashless dithiocarbamate. EP '800 allegedly teaches that the lubricating oil composition has a boron content in an amount of 0.01 to 0.2 weight %, that suitable metal-containing detergents include

metal salicylate and metal sulfonate, and that the metal may be an alkaline earth metal such as calcium, magnesium, and barium. The detergents may allegedly be neutral or overbased and have a total base number of 150 to 300 mg KOH/g or higher. The Examiner argues that the ashless dithiocarbamate may be added to the composition in an amount of 0.1 to 5 weight % and concludes that EP '800 teaches all of the claimed elements. The Examiner acknowledges that although the claimed amount of sulfur of 0.01 to 0.3 % by mass is not taught by EP '800, the dithiocarbamate component may be added to the EP '800 composition in an amount such that the sulfur content is within the claimed range. Applicant respectfully traverses this rejection as follows.

In the field of lubricating oil compositions, particularly those used for automatic transmissions, gears, and manual transmissions, it is well known that there is a trade-off relationship between anti-wear properties (preventing wear loss) and anti-fatigue properties (preventing a lubricated surface from being damaged by pitching or flaking for a long period of time). Until now, it has been extremely difficult for those skilled in the art to find effective methods or techniques which are able to overcome this undesirable relationship and optimize both properties.

However, Applicant has discovered that both anti-wear and anti-fatigue properties may be remarkably improved by using the claimed specific oil compositions which comprise particular amounts of: (A) a boron-containing ashless dispersant; (B) an alkaline earth metal-based detergent with a base number of 0 to 500 mg KOH/g, and (C) a sulfur-based additive. As shown in Tables 1-1 to 1-3, 2-1, and 2-2 (pages 42-46 of the present application), the samples of Inventive Examples 1 to 14 exhibit excellent anti-wear and fatigue life properties, compared with those of Comparative Examples 1 to 5. The sample of Comparative Example 4 contains no component (C), and the other comparative samples do not contain the claimed amounts of components (A), (B), and (C). Accordingly, these comparative samples do not exhibit excellent anti-wear and fatigue life properties.

EP '800 teaches a lubricating oil composition for gas engines which contains a base oil, metal-containing detergent, boron-containing alkenyl- or alkyl succinimide, zinc dialkyldithiophosphate, oxidation inhibitor, and ashless dithiocarbamate. EP '800 does not teach or suggest the elements of the present independent claims or any claims which depend therefrom as follows. Present claim 1 recites a lubricating oil composition which contains at least one sulfur-based additive, which may be a thiozole compound (C-1), thiadizole compound (C-2), or

sulfurized ester compound (C-6). None of these sulfur-based additives are taught or suggested by EP '800.

Claim 6 recites a lubricating oil composition for transmissions in automobiles, which the Examiner acknowledges is not taught or suggested by EP '800.

Finally, independent claim 10 recites a lubricating oil composition which consists essentially of components (A), (B), and (C), a sulfur-based additive other than zinc dialkyldithiophosphate. Claim 10 thus excludes any other components which would materially affect the basic and novel characteristics of the composition, such as the oxidation inhibitor and ashless dispersant which are critical components in the EP '800 composition. Accordingly, EP '800 does not teach or suggest all of the elements of any of the independent claims.

The elements of various dependent claims are also not taught by EP '800. For example, EP '800 does not teach or suggest the specific sulfur-based additives represented by formulas (7), (8), and (9), as recited in claims 20-25. Finally, EP '800 is completely silent as to the trade-off relationship between anti-wear and anti-fatigue properties and thus the properties of the claimed compositions would not have been expected based on EP '800.

For all of these reasons, the present claims are not anticipated by or obvious over EP '800, and reconsideration and withdrawal of the § 102 and § 103 rejections based on EP '800 are respectfully requested.

Rejections Under § 102(a), § 102(b), and § 103(a) Based on JP '491

Regarding claims 1-5, the Examiner argues that JP '491 teaches a lubricating oil composition suitable for use in an internal combustion engine which comprises a major amount of two specified mineral oils and, as additives, an organomolybdenum compound, a polybutenylsuccinimide-boron adduct, an alkaline earth metal sulfonate and an alkaline earth metal salicylate. JP '491 allegedly teaches that the amount of boron in the oil composition is about 0.004 to 0.014% by weight and that the sulfonate and salicylate detergents may be overbased and have a total base number of 310 to 500 mg KOH/g. JP '491 allegedly also allows for the addition of an organic polysulfide compound in an amount of 50 to 1000 ppm of sulfur. The Examiner concludes that the JP '491 composition teaches all of the claimed elements. Applicant respectfully traverses this rejection as follows.

JP '491 teaches a lubricating oil composition for internal combustion engines which contains two mineral oils having specific kinematic viscosities, an organomolybdenum

compound, a polybutenylsuccinimide-boron adduct, an alkaline earth metal sulfonate and an alkaline earth metal salicylate. JP '491 does not teach or suggest the elements of the present independent claims or any claims which depend therefrom as follows. Present claim 1 recites a lubricating oil composition which contains at least one sulfur-based additive, which may be a thiazole compound (C-1), thiadizole compound (C-2), or sulfurized ester compound (C-6), in an amount of 0.01 to 0.3% by mass in terms of sulfur. JP '491 does not teach or suggest a thizole or sulfurized ester compound. Further, in paragraph [0027], JP '491 teaches that additives may be included in the composition, including metal deactivators such as thiadiazole in an amount of 3 to 10% by weight. However, there is no teaching or suggestion of including such a compound in an amount of 0.01 to 0.3% as claimed, nor would there be any motivation to reduce the JP '491 concentration to the claimed range. Accordingly, JP '491 does not teach or suggest all of the claimed elements.

Claim 6 recites a lubricating oil composition for transmissions in automobiles, which the Examiner acknowledges is not taught or suggested by JP '491.

Finally, independent claim 10 recites a lubricating oil composition which consists essentially of components (A), (B), and (C), a sulfur-based additive other than zinc dialkyldithiophosphate. Claim 10 thus excludes any other components which would materially affect the basic and novel characteristics of the composition, such as the organomolybdenum compound, two specific mineral oils, alkaline earth metal sulfonate and alkaline earth metal salicylate which are all required components of the JP '491 composition. Accordingly, JP '491 does not teach or suggest all of the elements of any of the independent claims.

The elements of various dependent claims are also not taught by JP '491. For example, JP '491 does not teach or suggest the specific sulfur-based additives represented by formulas (7), (8), and (9), as recited in claims 20-25. Finally, JP '491 is completely silent as to the trade-off relationship between anti-wear and anti-fatigue properties and thus the properties of the claimed compositions would not have been expected based on JP '491.

For all of these reasons, the present claims are not anticipated by or obvious over JP '491, and reconsideration and withdrawal of the § 102 and § 103 rejections based on JP '491 are respectfully requested.

Rejections Under § 102(a), § 102(b), and § 103(a) Based on JP '875

Regarding claims 1-5, the Examiner argues that JP '875 teaches gear compositions comprising a base oil and, as additives, (A) 2-10 mass % phosphorus-base and/or sulfur-base extreme pressure agent, (B) 100-500 mass ppm (in terms of boron) of a boric acid-modified succinimide, (C) 100-1000 mass ppm (in terms of an alkaline earth metal) detergent having a total base number of 100 mg KOH/g or higher, and (D) 150 to 1500 mass ppm (in terms of zinc) of an alkyldithiophosphate. The Examiner concludes that JP '875 teaches all of the claimed elements. The Examiner acknowledges that JP '875 does not teach or suggest the claimed amount of sulfur of 0.01 to 0.3% by mass, but takes the position that the sulfur extreme pressure agent may be added to the composition such that the sulfur content is within this claimed range. Applicants respectfully traverse this rejection as follows.

The publication date of JP '875 is January 9, 2002, which is after the September 17, 2001 priority date of the present application, the filing date of the priority document. Enclosed herewith is a verified English translation of the priority document, JP 2001-282319. Since all of the rejected claims are fully supported in the priority document, JP '875 is removed as a prior art reference, and reconsideration and withdrawal of the § 102 and § 103 rejections are respectfully requested.

Rejection Under § 103(a) Based on Hata

Regarding claims 1-6, the Examiner argues that Hata discloses a traction drive fluid which comprises a base oil blended with: (A) an active phosphate ester base compound, (B) a boron-containing imide base dispersant, and (C) a boron-free imide base dispersant such that the boron content derived from component (B) is 100-600 ppm by weight, based on the base oil. Hata allegedly teaches that the oil composition may be used for a traction drive continuous variable transmission used in an automobile. Hata allegedly allows for the addition of other additives to the traction drive fluid, including salicylate detergents, metal sulfonate rust preventive agents, sulfur-containing antiwear agents, and metal deactivators of the benzotriazole and thiadiazole types. The Examiner concludes that the traction drive fluids of Hata meet the claimed limitations. Further, the Examiner argues that while the claimed amount of sulfur of 0.01 to 0.3% by mass in the lubricant composition is not taught by Hata, the sulfur-containing components may be added to the composition in conventional amounts such that the sulfur content is within this claimed range. Applicants respectfully traverse this rejection as follows.

Hata teaches a traction drive fluid which provides excellent wear resistance and scoring resistance, and which is suitable for use as a lubricating oil composition for a traction drive continuously variable transmission used in automobiles. However, Hata does not teach or suggest the trade-off relationship between anti-wear and anti-fatigue properties, and thus would not lead one skilled in the art to the presently claimed invention.

The Examiner argues that Hata allows for the addition of other additives to the traction drive fluid, including salicylate detergents, metal sulfonate rust preventative agents, etc. based on the description at column 7, line 1-13. However, Hata merely teaches the possibility of the use thereof as well-known additives and does not include any of these additives in any of the Examples described in the specification.

One skilled in the art would not have been motivated based on Hata to include in the composition 0.01 to 0.3% by mass of a sulfur-based additive (such as the specific compounds C-1, C-2, C-6 included in a preferred embodiment). Hata generally teaches "metal deactivators of benzotriazole base and thiadiazole base" (col. 7, lines 11-12) but is completely silent as to the amounts of such compounds which may be included. Therefore, it would certainly not merely require routine experimentation to select the specific claimed compounds and to adjust their amounts to the claimed amounts, which, as set forth previously, are critical to providing the observed properties.

Further, based on Hata, one skilled in the art would not have been motivated to also specifically include an alkaline earth metal based detergent with a base number of 0 to 500 mg KOH/g in an amount of at least 0.01% by mass as claimed. Hata merely teaches "detergents/dispersants of imide base, ester base, benzylamine base phenate base, and salicylate base" (col. 7, lines 5-6); there is no specific teaching of base number or amount of such compounds. In fact, despite the broad teaching in col. 7, Hata teaches in col. 1, line 61 to col. 2, line 4 that the use of a metal base detergent (calcium sulfonate having a total base number of 200) results in deterioration of the lubricating characteristics. Hata thus teaches away from the inclusion of such a component, and aims at improving wear resistance and scoring resistance by means and methods which do not require the use of metal base detergents.

However, as shown in Tables 1-1 to 1-3 of the present specification, the compositions of Inventive Examples 1 to 9 and 13-14, which each contain calcium sulfonate having a total base number of 300 as an essential component, exhibited excellent anti-wear and anti-fatigue properties. In comparison, Comparative Example 2, which only contains 0.004 mass % of this

component, exhibited inferior properties. Such results would not have been expected based on Hata.

Claim 10 recites a lubricating oil composition which consists essentially of components (A), (B), and (C), a sulfur-based additive other than zinc dialkyldithiophosphate. Claim 10 thus excludes any other components which would materially affect the basic and novel characteristics of the composition, such as the active phosphate ester base compound and boron-free imide base dispersant which are required components of the Hata composition. Accordingly, Hata does not teach or suggest all of the elements of any of the independent claims.

The elements of various dependent claims are also not taught by Hata. For example, Hata does not teach or suggest the specific sulfur-based additives represented by formulas (7), (8), and (9), as recited in claims 20-25. Finally, Hata is completely silent as to the trade-off relationship between anti-wear and anti-fatigue properties and thus the properties of the claimed compositions would not have been expected based on Hata.

For all of these reasons, the present claims are not obvious over Hata, and reconsideration and withdrawal of the § 103 rejection based on Hata are respectfully requested.

In view of the preceding Amendments and Remarks, it is respectfully submitted that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,
Eitaro MORITA

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By: 

SANDRA M. KATZ
Registration No. 51,865
AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.
One Commerce Square
2005 Market Street - Suite 2200
Philadelphia, PA 19103-7086
Telephone: (215) 965-1200
Direct Dial: (215) 965-1344
Facsimile: (215) 965-1210
E-Mail: skatz@akingump.com

Encl.: Verified English translation of JP 2001-282319 priority document
Petition for Extension of Time (one month)
Amendment Transmittal